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The Journal of the American Association of Zoo Keepers, Inc.

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Animal Keepers' Forum

August 2015, Volume 42, No. 8

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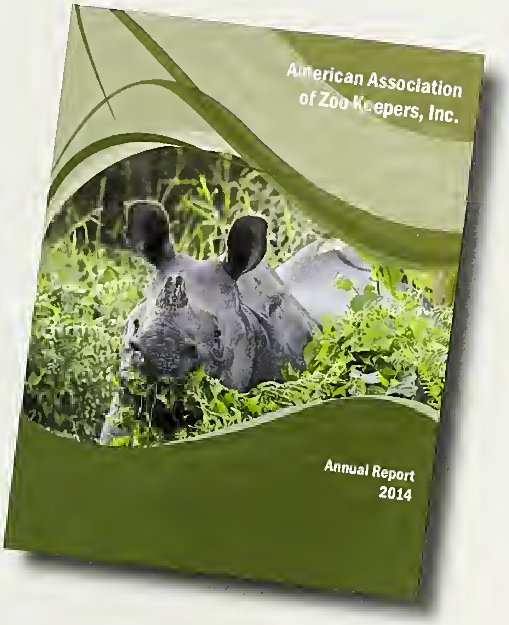

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Annual Report 2014

Abbreviated AAZK Annual Report included in this issue!
Pages 239-242

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American Association of Zoo Keepers, Inc.

The American Association of Zoo Keepers, Inc. exists to advance excellence in the animal keeping profession, foster effective communication beneficial to animal care, support deserving conservation projects, and promote the preservation of our natural resources and animal life.

About the Cover

This month's cover features a secretary bird (*Sagittarius serpentarius*) by Dane Jorgensen of Birmingham Zoo. It is a large, mostly terrestrial bird of prey found in sub-Saharan Africa. It is a member of the order Accipitriformes which includes many other diurnal raptors, but it is given its own family, Sagittariidae.

It is believed the secretary bird got its name in the 1800's when Europeans first spotted the birds. During this time period, male secretaries wore gray tailcoats, knee-length pants, and used goose-quill pens that were often carried behind their ears. The feather ensemble of gray breast, black leg, and long, black, quill-like feathers protruding from the birds' heads may have led to its name.

The territory of a secretary bird can cover 50 square kilometers and they can cover 20 miles (32 kilometers) or more in a single day of hunting for food. Prey includes small mammals, reptiles, birds and large insects. Designated as "Vulnerable" by the IUCN, the main threat to secretary birds is habitat loss.

Articles sent to ***Animal Keepers' Forum*** will be reviewed by the editorial staff for publication. Articles of a research or technical nature will be submitted to one or more of the zoo professionals who serve as referees for ***AKF***. No commitment is made to the author, but an effort will be made to publish articles as soon as possible. Lengthy articles may be separated into monthly installments at the discretion of the Editor. The Editor reserves the right to edit material without consultation unless approval is requested in writing by the author. Materials submitted will not be returned unless accompanied by a stamped, self-addressed, appropriately-sized envelope. Telephone, fax or e-mail contributions of late-breaking news or last-minute insertions are accepted as space allows. Phone (330) 483-1104; FAX (330) 483-1444; e-mail is shane.good@aazk.org. If you have questions about submission guidelines, please contact the Editor. Submission guidelines are also found at: aazk.org/akf-submission-guidelines/.

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ANIMAL KEEPERS' FORUM

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FROM THE EDITOR

Recently my zoo celebrated the international event known as "Dreamnight at the Zoo". This is an annual event hosted at 300 zoos and aquariums in 35 countries for children with special needs or chronic illness. This special evening offers these children and their families an exclusive experience at each zoo or aquarium. As preparations for our event at my zoo began, I wondered how many zoo keepers realized it was one of their colleagues who created the concept of "Dreamnight at the Zoo".

Peter van der Wulp, an Animal Keeper at the Rotterdam Zoo in The Netherlands, created "Dreamnight at the Zoo" in 1996. I first learned about Dreamnight at the Zoo while attending the First International Congress on Zookeeping in 2003. The conference was hosted by the ICZ, of which AAZK is a founding member. Ko Veltman, another Dutch Zoo Keeper, presented to the conference delegates, and like me, most were hearing about "Dreamnight" for the very first time. To see the slides of chronically ill children smiling at the opportunity to visit the zoo animals that we get to see every day, and for us to have the opportunity to make such a positive impact on the lives of these families, those of us in the audience were nothing short of inspired. We all went back to our own zoos and asked our directors to join the "Dreamnight" cause.

There is a lot to be learned from "Dreamnight at the Zoo". Zoo Keepers can accomplish great things. Peter van der Wulp had an idea and it turned into an international phenomenon; animal keepers are great innovators. You don't need to be a zoo manager or director to make great achievements. Part of why "Dreamnight" was so successful was because Peter and Ko shared their passion with their colleagues. The sharing of information is one of the most important things we can do in this profession, whether the topic is animal husbandry, conservation, or how to brighten the day of a family. "Dreamnight at the Zoo" was one of the best things to come from the first ICZ conference. By helping spread the word about "Dreamnight" to an international audience, the concept quickly crossed borders and became a common name in our zoo vocabulary.

I have been privileged to do many exciting things throughout my long zoo career, but the one thing that always warms my heart the most is participating in "Dreamnight at the Zoo". If your zoo isn't participating yet, ask your director if your zoo can be the next to join this international program. Meanwhile, think of keepers like Peter and remember that you can achieve great things too. AAZK and the ICZ were created to help you reach your goals.

Shane Good, Editor
Animal Keepers' Forum
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COMING EVENTS

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e-mail shane.good@aazk.org

September 9-12, 2015
Association of Zoo Veterinary Technicians' Annual Conference
Tacoma, Washington
Hosted by Point Defiance Zoo and Aquarium
For more information visit:
http://azvt.org/conference2015.htm

September 9-13, 2015
International Congress on Zookeeping
Leipzig, Germany
Hosted by Leipzig Zoo and the International Congress of Zookeepers (ICZ).
For more information visit:
iczoo.org.

September 17-21, 2015
AZA National Conference
Salt Lake City, UT
Hosted by Utah's Hogle Zoo
For more information visit:
aza.org.

September 21-26, 2015
Zoo and Aquarium Docents Regional Conference
El Paso, TX
For more information visit:
azadocents.org

October 5-9, 2015
Giraffe Care Workshop
Colorado Springs, CO
Hosted by Cheyenne Mountain Zoo
For more information visit:
cmzoo.org/index.php/giraffe-care-workshop/

October 11-15, 2015
Orangutan SSP Husbandry Workshop
Wichita, KS
Hosted by Sedgwick County Zoo
For more information visit:
scz.org/visitor_tickets-conferences.php

October 12-16, 2015
Zoos and Aquariums Committing to Conservation Conference (ZACC)
Denver, CO
Hosted by Denver Zoo
For more information go to:
http://www.denverzoo.org/ZACC

October 29-November 1, 2015
Advancing Bear Care - 2015
Hanoi, Viet Nam
Hosted by Bear Care Group
For more information visit:
bearcaregroup.org/#!abc-2015—vietnam/c227f

November 6-8, 2015
Southeast Regional Gorilla Workshop
Tampa, FL
Hosted by Busch Gardens Tampa.
For more information contact:
keri.bauer@buschgardens.com

AMERICAN ASSOCIATION of ZOO KEEPERS

September 27 - Oct. 1, 2015
AAZK National Conference
St. Louis, MO
Hosted by Saint Louis Zoo and St. Louis Chapter of AAZK
More details can be found at: www.stlzoo.org/animals/soyouwanttobeazookeeper/americanassociationofzooke/

November 18-22, 2015
New World Primate TAG Husbandry Workshop
San Diego, CA
Hosted by San Diego Zoo
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To the Editor
Animal Keepers' Forum

Taking Issue with the Practice of So-called "Euthanasia for Population Management"

This article was written in response to the recent publication in *Animal Keepers' Forum* of the articles: "Humane Euthanasia of Animals for Population Management" and "Nationwide Survey of Keeper Attitudes and Knowledge Regarding Population Management Euthanasia."

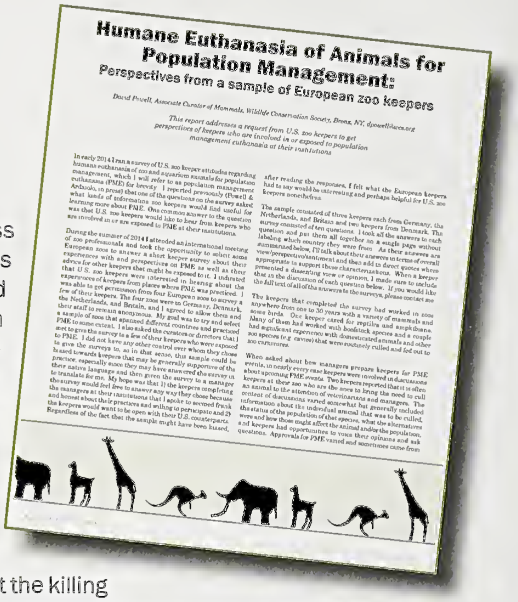
Euthanasia is properly practiced only for the benefit of the individual, and only when that individual is in dire and hopeless straits. Euthanasia is not properly a method of killing at all, but rather a means of easing death when an animal's time to die has come.

The argument made by some European zoos that "the death of healthy animals is quite natural and many animals die in the wild" is not a legitimate rationale for the killing of healthy animals in zoos. In the wild, animals are sovereign creatures. They make their own decisions and take their own chances. In the wild, in any given encounter with natural forces, there is always a chance of an animal escaping death to live another day. In the zoo setting, it is we who are sovereign and we who make the decisions about what happens to an animal. Killing a healthy animal in a zoo is far more similar to a canned hunt or a poaching incident than it is like a lion taking down a gazelle. The zoo animal has no chance to react, no chance to escape the harm.

When we take a wild animal into captivity (either literally because the animal is captured from the wild, or figuratively because we are breeding wild animals in captivity), we enter into a contract with that animal. In exchange for a loss of the animal's freedom and sovereignty, we will give that animal a permanently safe haven— a healthy, happy, and species-appropriate home with plenty of food and no predators for as long as the animal lives. That's the deal. To renege on that agreement by killing the animal out of hand merely for population management is a breach of the contract we made, and a betrayal of the animal for whom we have chosen to make ourselves responsible.

Individuals matter. Indeed, any species has value only insofar as the individuals that make up that species have a value. If all lions were the same lion, there would be no need to have more than one. And if individual lions didn't matter, there would be no need to have a real lion at all. A stuffed statue or an animatronic robot would be just as good as the flesh-and-blood version, if not better. The same is true of the human species. Why do we think it is wrong to humanely wipe out millions of human beings for population management when we know for a fact that the earth is vastly overpopulated with the human species? It is wrong precisely because those individual people who would get wiped out each have an individual value. Each person is irreplaceable and precious and cannot be killed to address overall population control. Each animal in our collection is likewise irreplaceable and precious.

The killing of healthy zoo animals is unethical in another important way—it sends the opposite message to the one that zoos are supposed to be getting across to the public. As places where wild animals are kept in captivity, zoos derive their legitimacy from their primary role in demonstrating to the public that wild animals are valuable and precious and worth saving in the wild. But the killing of healthy animals in the collection teaches instead that wild animals are interchangeable, expendable, throwaway objects that should never be allowed to inconvenience human beings and their institutions. For a zoo to disseminate such a message is a complete betrayal of all that the modern zoological society is supposed to stand for. Furthermore, when some institutions choose to teach this lesson, it gives all zoological societies a bad name whether deserved it or not.



Humane Euthanasia of Animals for Population Management:
Perspectives from a sample of European zoo keepers

David Powell, Associate Curator of Mammals, Wildlife Conservation Society, Bronx, NY, dpowell@wcs.org

This report addresses a request from U.S. zoo keepers to get perspectives of keepers who are involved in or exposed to population management euthanasia at their institutions

In early 2014 I ran a survey of U.S. zoo keeper attitudes regarding humane euthanasia of zoo and aquarium animals for population management, which I will refer to as population management euthanasia (PME) for brevity. I reported previously (Powell & Ardaiolo, in press) that one of the questions on the survey asked what kinds of information zoo keepers would find useful for learning more about PME. One common answer to the question was that U.S. zoo keepers would like to hear from keepers who are involved in or are exposed to PME at their institutions.

During the summer of 2014 I attended an international meeting of zoo professionals and took the opportunity to solicit some European zoos to answer a short keeper survey about their experiences with and perspectives on PME as well as their advice for other keepers that might be exposed to it. I indicated that U.S. zoo keepers were interested in hearing about the experiences of keepers from places where PME was practiced. I was able to get permission from four European zoos to survey a few of their keepers. The four zoos were in Germany, Denmark, the Netherlands, and Britain, and I agreed to allow them and their staff to remain anonymous. My goal was to try and select a sample of zoos that spanned different countries and practiced PME to some extent. I also asked the curators or directors that I met to give the survey to a few of their keepers who were exposed to PME. I did not have any other control over whom they chose to give the surveys to, so in that sense, this sample could be biased towards keepers that may be generally supportive of the practice, especially since they may have answered the survey in their native language and then given the survey to a manager to translate for me. My hope was that 1) the keepers completing the survey would feel free to answer any way they chose because the managers at their institutions that I spoke to seemed frank and honest about their practices and willing to participate and 2) the keepers would want to be open with their U.S. counterparts. Regardless of the fact that the sample might have been biased, after reading the responses, I felt what the European keepers had to say would be interesting and perhaps helpful for U.S. zoo keepers nonetheless.

The sample consisted of three keepers each from Germany, the Netherlands, and Britain and two keepers from Denmark. The survey consisted of ten questions. I took all the answers to each question and put them all together on a single page without labeling which country they were from. As their answers are summarized below, I'll talk about their answers in terms of overall view/perspective/sentiment and then add in direct quotes where appropriate to support these characterizations. When a keeper presented a dissenting view or opinion, I made sure to include that in the discussion of each question below. If you would like the full text of all of the answers to the surveys, please contact me.

The keepers that completed the survey had worked in zoos anywhere from one to 30 years with a variety of mammals and some birds. One keeper cared for reptiles and amphibians. Many of them had worked with hoofstock species and a couple had significant experience with domesticated animals and other zoo species (e.g. cavies) that were routinely culled and fed out to zoo carnivores.

When asked about how managers prepare keepers for PME events, in nearly every case keepers were involved in discussions about upcoming PME events. Two keepers reported that it is often keepers at their zoo who are the ones to bring the need to cull an animal to the attention of veterinarians and managers. The content of discussions varied somewhat but generally included information about the individual animal that was to be culled, the status of the population of that species, what the alternatives were and how those might affect the animal and/or the population, and keepers had opportunities to voice their opinions and ask questions. Approvals for PME varied and sometimes came from

Finally a warning: If we give up our role as organizations that champion and illustrate the intrinsic value of wild animals and instead devolve into mere menageries that exist solely for the amusement of idle human gawkers, we won't have a leg to stand on when we are accused by animal rights groups of callously abusing animals for the sake of crass human profit. If we give up the moral high ground on which we (most of us) now stand, we cannot defend the legitimacy of our own jobs or our institutions' right to exist.

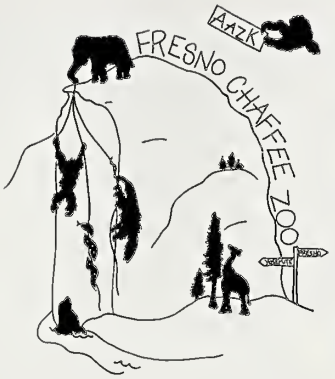
Zoos worldwide need to get much more creative and intelligent in their animal husbandry techniques so that issues of population management can be dealt with in a humane, responsible, ethical and effective fashion. We need to form more consortia among zoos and aquariums so that when space gets tight at one institution an animal can be moved to another institution where it will become a valuable contributing member of the collection. We need to refine our birth control and artificial insemination protocols so that they better serve our animals and our collection needs. We need to increase the space available for zoo animals to live out their lives. Some small struggling zoos might need to close down in order to combine resources to make a bigger, better, more effective zoo. We are all in this together, and if we work together we can solve population management problems without betraying our principles and our animals.

Respectfully submitted,

Sarah Love
Brookfield Zoo

Starting a New AAZK Chapter at the Fresno Chaffee Zoo

Katie DeLorenzo
Fresno Chaffee Zoo AAZK President



AMERICAN ASSOCIATION OF ZOO KEEPERS

I recently started a new AAZK Chapter at the Fresno Chaffee Zoo in California. To me, being a zoo keeper is synonymous with being an AAZK member, and the director at the Fresno Chaffee Zoo was extremely supportive when I mentioned that the keepers would like to start a Chapter. I was anxious at first, wondering if I would be able to figure out all of the details that went along with it. I found out that all you need is a small group of organized, passionate individuals because AAZK, Inc. has done all the work to spell out exactly how to set up a new Chapter. Here are step-by-step instructions and some helpful hints about our experience during the first few years.

Simple Steps

1. **Talk to Keepers**
   Make a list of keepers that are interested in joining. You only need a few to get started. We had a group of about ten individuals that said they were definitely going to join. Also ask each person if they would be willing to be an officer.
2. **Talk to Zoo Administration**
   Have clear goals of what you would like to accomplish and why. Having your zoo support your Chapter will make a huge difference in what you can do when it comes to fundraisers and advertizing your conservation message. First I spoke with my direct supervisor, then the director of our zoo.
3. **Ask for paperwork from AAZK, Inc.**
   After you find out that there is enough interest at your zoo, contact AAZK, Inc. and ask them to mail you all necessary paperwork. This will include an easy to follow step-by-step guide on how to complete the necessary steps to make your Chapter official. AAZK, Inc. can also put you in contact with other new Chapters for advice on how they got started.
4. **Elect Officers**
   Go back to your list of interested keepers and have anyone that wants a chance to be on the Board join AAZK National. Anyone that wants to vote for officers must also join AAZK National. Here at the Fresno Chaffee Zoo, we scheduled an informational meeting to explain why keepers should join and what would be involved in being an officer. At a later date, we had nominations and elections and had our first group of AAZK members.
5. **Fill out the Paperwork**
   Once you have officers voted on, you may fill out your paperwork that you received from step 3. All officers must sign it before you send it back. This paperwork will include your first By-laws (easy- just fill in the blanks.)
6. **Welcome to AAZK**
   You will receive a packet in the mail announcing that you are now an official Chapter. The packet will include your tax ID # and financial expectations. Yes, you will need to do taxes every year by filling out a "Recharter Packet", which is easy if you have an organized treasurer. You must save every single receipt and have a record of all income/expenses. We suggest that you look over an example of a "Recharter Packet" *before* you have a single Chapter meeting or fundraiser. This will give you an idea of how to keep structured records throughout the year. We suggest using an Excel spreadsheet, but if Excel is not your thing, paper works too. This is the intimidating sounding part of the process, but as long as you are organized (yes, I will keep stressing this word) it really is not that difficult.

Helpful Hints

- **Recruiting New Members**
  Be welcoming of everyone. We currently have approximately 30 members. More than half of them are docents. Remember, many fundraisers happen at weekend zoo events. How many zoo keepers have weekends off? Exactly. Docents and volunteers are a huge help. They add another perspective at meetings. Love and appreciate them.
- **Chapter Fees**
  Fresno Chaffee Zoo AAZK decided not to have a Chapter fee. Most people at our zoo had never been a part of an AAZK Chapter before. Since members already pay to be at the National level, we wanted to stop after that or we were afraid no one would be able to afford to join.
- **Starting at Zero**
  We sat around a table one day and couldn't decide how to have a fundraiser without having any money yet. A docent took pity on us and tossed $20 at the officers.

  A great fundraiser to have in the beginning with a huge potential for profit is a yard sale. All you need to buy is poster board and markers to make signs. Ask for donations a month or two in advance from staff, docents, and volunteers. Find a good location. You can make $1000 in a day. Yard sales are a great way to establish a checking account for your Chapter.
- **Advertizing and AAZK Updates**
  Ask your zoo permission to have an announcement board in a staff common area of the zoo. We have two, in the main staff break room and in the docent lounge. We have flyers about when the next meeting is, upcoming fundraisers, how to join our AAZK Chapter, good articles from the *Animal Keepers' Forum*, etc. We also announce when we give money to conservation efforts.
- **Do Presentations at All Staff Meetings**
  We talk about Bowling for Rhinos each year. It's a good way to remind people that their zoo has a Chapter and they can be involved. Even if they do not want to join the Chapter or participate in events like Bowling for Rhinos, including them will encourage them to make donations to fundraisers and make sure they are excited about the Chapter.
- **Positive Reinforcement**
  Make the meetings fun. We bring food, have movie nights, and make sure everyone has a voice at our Chapter meetings. I am a member of AAZK for two main reasons: to raise money for conservation and to hang out with people that I don't normally get to work with on a daily basis.

Hopefully this article is helpful. Since 2013, the Fresno Chaffee Zoo AAZK Chapter has given over $5300 to conservation efforts. We are just starting out, but already feel that we are making a difference in the world. Like most zoo keepers, we talk about conservation to zoo visitors every day and are now leading by example.

The AAZK Board and Staff thanks Fresno's Chaffee Zoo AAZK Chapter for sponsoring the *Animal Keepers' Forum* in 2015.

Parental Provisioning in Captive Red-billed Hornbills (*Tockus erythrorhynchus*)

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[3]Current Address: DePaul University, 2400 N. Sheffield Avenue, Chicago, IL 60614

Introduction

The level to which parents provision offspring varies across species and may be influenced by factors such as brood size, care requirements of offspring, and the cost of parental investment. For example, a clutch of eggs of some species of fish may require little or no care at all, whereas female mammals incur very high costs during both gestation and lactation (Davies et al., 2012). Birds typically employ bi-parental care in raising their broods. Because the female does not lactate, both parents can provide resources to the young, which greatly increases the overall survival of offspring, especially with altricial young (Davies et al., 2012).

In some bird species, such as the great kiskadee, both parents participate equally in delivering food to chicks during the nesting period (Llambas, 2003). However, males may spend more time providing care if the female's ability to provide care is compromised or heavy predation requires the male to protect the nest (Markman et al., 1995; Fraser, 2002). The saddle-billed stork also employs bi-parental care of eggs and chicks, however females provide substantially more care than males (Elston et al., 2010).

Hornbills (Bucerotidae) have a distinctive nesting behavior that may influence the patterns of caregiving of males and females. The mating pair chooses a small cavity in their environment as their nesting site and, after the female enters the nest, covers the entrance with spackle (a mixture composed mainly of food material, with some fecal matter), and leaves a slit the width of their bills in the spackle. For the entire nesting period (approximately two months in the red billed hornbill), the female remains in the nest cavity, relying on the male for food (Moreau, 1937). After one month of brooding chicks, the hornbill mother will emerge from the nest box and the chicks reseal the hole. Then, both parents deliver food to the chicks. After approximately one to two weeks, depending on clutch size, the chicks will widen the slit in the spackle and emerge from the nest box. Following emergence, the parents will continue to feed the chicks outside of the nest box (A. Waier, pers. comm.).

Producing eggs and remaining in the nest box during the nesting period can be costly to the female, which could decrease the resources she has available to provide care for her brood after incubation. This would imply that the male, having more resources available, might spend more time provisioning after the female leaves the nest box (Liker and Székely, 2005). On the other hand, while the females are sealed in the nest box, males are the primary provider of food to both the female and the brood. Because the male decreases his time spent caring for himself during this time, he may spend more time recovering lost resources once the female leaves the nest box and is able to deliver food to the chicks on her own (Stanback et al., 2002). Alternatively, the female and chicks may form a close bond during incubation that continues as they leave the nest box, leading her to spend more time provisioning.

There may also be certain characteristics of chicks that can result in differential provisioning by their parents. Slagsvold (1997) found that sibling rivalry could be a major factor in the proportion of care an individual chick receives. Larger chicks in this case are expected to receive more frequent parental care compared to smaller chicks because they are able to push the smaller chicks out of the way and obtain attention from the parents. On the other hand, it has been observed that chicks that hatch last in a brood have a smaller body mass as well as increased begging behavior, which may elicit more food from the parent(s) (Siano et al., 2001). However, no bias may be evident if the brood is small, and thus it is advantageous for the fitness of the parents to provide care equally among all chicks in the brood. Although sex-biased provisioning is seen in some avian species (Ligon and Hill, 2010), there is no literature on the effects of chick gender on the distribution of care by hornbills.

This study aimed to determine if the frequency of parental care differs between the mother and father in a pair of captive red-billed hornbills at the Milwaukee County Zoo. In addition, we investigated whether either parent showed a bias for any specific chick.

Methods

Subjects and exhibit

Our focal subjects are an experienced mated pair of captive red-billed hornbills, *Tockus erythrorhynchus*, housed in the aviary building at the Milwaukee County Zoo, WI. The exhibit dimensions are 6m x 3m x 3m with a nest box located centrally on the ceiling that could be accessed via branches. The outer facing wall of the exhibit is made of tightly spaced vertical tension wires. The wall separating the focal exhibit from its neighboring exhibit is made of nylon zoo mesh, while the other two are made of painted plaster. The exhibit also contains various plants, a shallow pool of water, artificial and natural rocks/boulders of varying sizes, and a torpedo sand floor. Two food dishes are provided to the subjects daily and live crickets are provided daily and most often during our sampling periods. All subjects were individually recognizable based on colored plastic leg bands.

Nesting timeline

The nesting timeline was similar to that observed by Moreau (1937). The mother was sealed within the nest box on July 24th, 2013. Although it was impossible to determine the specific date of hatching, keepers used chick vocalizations to estimate that the three chicks hatched on or around August 24th. On September 25th, the mother left the nest box and the chicks re-sealed themselves inside. On October 2nd, the first two chicks emerged from the nest box, followed by the third chick on October 7th. Since actual hatching order was not observed, it was assumed that the order of emergence was also the order or hatching (A. Waier, pers. comm.).

Chick sex was determined via analysis of blood samples. The sex of the chicks was not revealed to the observers until all data had been collected in order to prevent any observer bias. Chicks are referred to

by their estimated hatching order followed by their sex (in parentheses).

Chick removal

This pair of red-billed hornbills has raised eight clutches to date. In each of the first seven clutches (2006 - 2012) the breeding male attempted to drive the female chicks from his territory once they were fully fledged (at about two months of age). Once the breeding male started chasing his female chicks, the entire clutch of chicks (males and females) were removed from the exhibit and placed off exhibit for their safety and to provide companionship for each other. The eighth clutch produced by the red-billed hornbill pair in 2013, (the subject of this paper) produced a different outcome. The adult male began to relentlessly chase and displace chick 2 (later determined to be a male) 10 days after fledging. Knowing that chick 2 had started self-feeding at a very young age, the aviary staff decided that he did not need his mother to help him obtain food. He was quickly removed from his enclosure for his own safety on October 10th. He was placed in the adjacent exhibit to allow him to continue to interact with the family.

Data collection

Data were collected from September 26th through November 14th, 2013, on Thursday afternoons in 45-minute sessions with approximately 5 minutes between sessions. All occurrences of feeding behavior were recorded during each session. Feeding behavior was defined as one parent carrying food in his/her beak and depositing (or attempting to deposit) it in the nest box or directly in the mouth of a chick, regardless of whether the chick accepted the food offered. Which parent fed and which chick received the food was recorded when possible. Thirty total hours of data were collected. On each day of observation, no more than three sessions (135 min) were conducted. We tested for inter-observer reliability (defined as 85% similarity between data collected during one session) prior to the start of data collection and after 15 observer-hours of data collection. Each observer collected data on one focal bird and the focal bird was alternated between observers for each session to reduce any potential bias.

Data analysis

All data were analyzed using SPSS. All sessions were treated as independent measures of behavior within a case-study design. Differences in mean number of feedings per session between parents as well as between weeks were analyzed using a 2-way between subjects analysis of variance (ANOVA). Post hoc analyses were made using Tukey's B. Since chick 2 (M) was removed after the third week of data collection, we analyzed the potential parental biases both before and after his removal. A 2-way between subjects ANOVA was also used to analyze potential chick biases for each parent before the removal of chick 2 (M). Since only two chicks remained after the removal of chick 2 (M), parental biases were analyzed using an independent sample t-test. For all figures, error bars represent one standard error.

Results

Influences of parental gender

There was a significant main effect of parental gender on the average number of feedings per session each week ($F_{(1, 24)} = 6.592$, $p < 0.05$). The father's overall feeding rate was higher than that of the mother (fig 1). We also found a significant main effect of week ($F_{(1, 24)} = 14.713$, $p < 0.05$). Post-hoc tests showed that both parents significantly decreased their feeding rate after weeks one and two. Interaction between factors was not significant ($F_{(7, 24)} = 1.380$, $p = 0.259$).

Biases towards chicks

We found no significant bias towards a specific chick by the father ($F_{(2, 17)} = 1.176$, $p=0.335$, fig. 2a) before or after ($t=0.660$, $p=0.516$, fig. 2b) the removal of chick 2 (M). Similarly, there was no significant bias towards a specific chick by the mother either before ($F_{(2, 17)} = 1.607$, $p=0.233$; fig. 2a) or after ($t= -2.007$, $p=0.056$, fig. 2b) the removal. The mother tended to direct more care toward chick 3 (F) than to chick 1 (F), but this difference was not statistically significant, most likely due to the small number of observations. Anecdotally, chick 3 (F) seemed to be the smallest chick.

Discussion

Our results indicate that the father did, on average, feed the chicks more often per session than the mother. Our data suggest that the father provides this higher frequency of care for a longer period of time than the mother (fig 1), extending into the fourth, and possibly fifth, week. In contrast, the mother seems to reduce her high frequency of feeding at the third week. This appears to support the findings of Liker & Székely (2005) who found that because males do not incur the high costs of producing eggs and remaining in the nest box, they are more likely to have the resources available to provide more care after the emergence of the chicks. Since red-billed hornbill females spend over two months in the nest, it is likely that high costs are incurred while producing, laying, and incubating eggs that may hinder the mother's ability to continue feeding her chicks for an extended period of time.

Due to high levels of aggression by the father towards chick 2 (M), chick 2 (M) was removed from the flock and placed in a neighboring exhibit. Interestingly, this type of forced male-dispersal is uncommon in monogamous species like the red-billed hornbill (Perrin and Mazalov, 2000) since there is minimal local mate competition. Although before the removal of chick 2 (M) the father did tend to feed the male chick less than the two females, the difference was not statistically significant. Although we found no statistically significant bias by the mother towards any chick, her allocation of feedings tended to correlate with the estimated hatching order. Since chick 3 (F) was the last to hatch and appeared to be the smallest, this correlation suggests that the mother may be employing a form of parental compensation. Parental compensation is a strategy in which a parent will allocate the most resources (feedings, for our study) to the youngest or smallest chick in order to reduce hierarchical competition between chicks. This type of care provisioning may also increase the overall survival of all members of the brood (Shizuka and Lyon, 2013).

In order to increase the success of captive breeding, one must take into account the differences in parental care strategies employed by each parent, as has been exemplified in this study. In captivity, forced dispersals prove very problematic and may require the removal of certain individuals from the family unit. When these issues arise, it is important to understand the amount of care provided by each parent in order to ensure the health of all chicks in the brood. Although this research provide some insight into the parental provisioning of captive red-billed hornbills, further research is needed to determine if these findings can be generalized to other captive pairs.

Acknowledgements

We thank the Milwaukee County Zoo for allowing us to conduct research in their aviary. A special thanks to Alex Waier and Carol Kagy for their help and support throughout this project.

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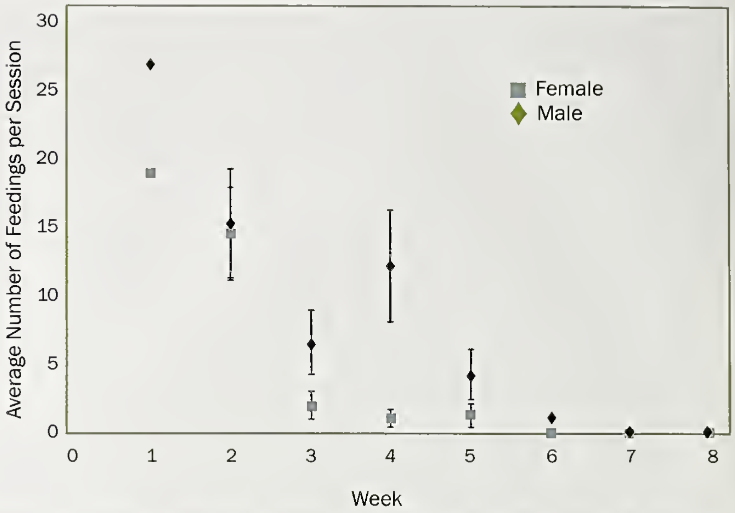

Figure 1. Overall, the male provided more care each week than the female (ANOVA, p<0.05) and average feedings per session for both parents decreased significantly after weeks 1 and 2 (ANOVA, p<0.05). The male also provided care for a longer period of time than did the female.

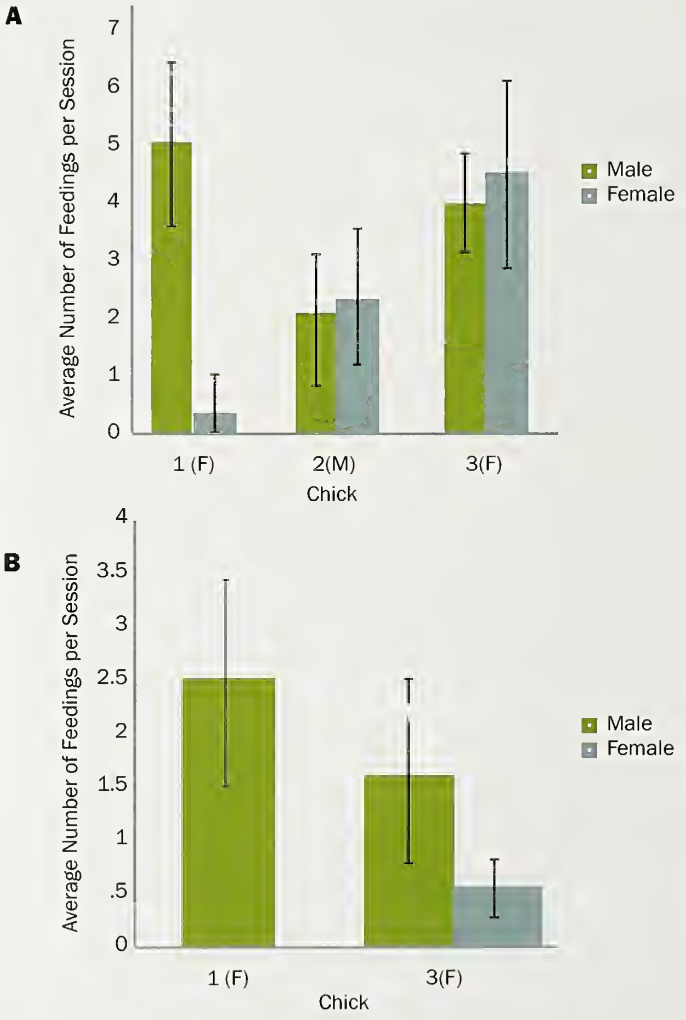

Figure 2. Neither parent had any bias towards any individual chick both before (a) or after (b) the removal of chick 2 (p_f=0.23, p_m=0.34 and p_f=0.68 and p_m=0.52, respectively).

This year, the American Association of Zoo Keepers published its first-ever annual report. We are happy to share this abbreviated version with our members. Thank you for your continued support!

Annual Report 2014

Thank You AAZK Chapters!

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Mesker Park Zoo Chapter
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Bowling for Rhinos

The American Association of Zoo Keepers' (AAZK) Bowling for Rhinos (BFR) program was conceived as a local fundraiser and has grown tremendously over the past 25 years into a recognized international conservation program. AAZK's BFR has now raised over $5.4 million since 1990 with 2014 being the most successful year to date with over $581,000 raised by 80 AAZK Chapters, individual donations and online giving.

AAZK's BFR program is fully supported by AAZK, its Chapters and membership, allowing 100% of all event profits and individual donations to go directly to *in-situ* species conservation. AAZK's BFR Program has benefited greatly from American Zoo and Aquarium (AZA) and Zoological Association of America (ZAA) institutional support of their AAZK Chapter's events. Increased support from host facilities/AZA will benefit both AZA and AAZK through increased event success.

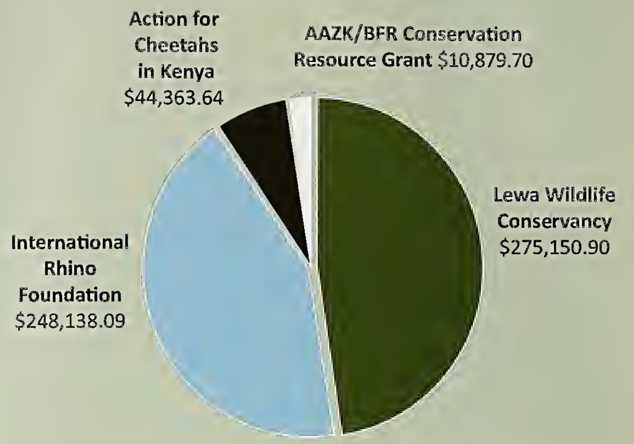
Championed by Anna Merz in the early 1980's, the Craig family established a rhino sanctuary on their cattle ranch in northern Kenya at a time when the black rhino population was facing the brink of extinction. The Ngare Sergoi Rhino Sanctuary has evolved into the Lewa Wildlife Conservancy (LWC) and is now home to 15% of Kenya's black rhino population, over 60 southern white rhino and the world's largest population of Grevy's zebra. Find more information at Lewa.org

In the mid and late 1990's, AAZK expanded funding efforts to include Ujung Kulon National Park in Java, Indonesia to help protect the Javan rhino, and National Parks in Sumatra, Indonesia to save Sumatran Rhinos, in partnership with the International Rhino Foundation (IRF). In Indonesia, the AAZK/IRF partnership now protects nearly 1.5 million acres of crucial lowland rainforest habitat for the survival of the Javan and Sumatran rhinos and other species living in their ecosystems including Sumatran tigers, elephants, tapirs, Javan gibbons and sun bears in one of the most biologically diverse places on the planet. Learn more at rhinos.org.

Total BFR Funds Raised

by deadline December 15, 2014

$578,532.33



In 2009, AAZK's BFR support expanded to include Action for Cheetahs in Kenya (ACK). This support added to the protection of not only cheetah but also rhino through education and conservation of shared habitat, creating a larger buffer zone of protection for critically endangered species. Visit actionforcheetahs.org.

Each year, AAZK dedicates 2% of the funds raised through AAZK's BFR to fund the AAZK/BFR Conservation Resources Grant which is awarded to an *ex-situ* or *in-situ* rhino conservation effort. Recent awards have been granted to support organizations such as RhiNOremedy that create, promote and distribute educational information to counter and eliminate the demand-side for rhino horn, elephant tusks and other illegal wildlife trade products. See rhinoremedy.org for more information.

AAZK's Bowling for Rhinos protects all five species of rhino and by association conserves habitat, protecting everything from orchids to sea turtles to elephants. AAZK, with our BFR partners, now protects over seven million acres of wildlife habitat in some of the most unique ecosystems in the world. AAZK's BFR program has raised over $5.4 million with 100% event profit and individual donations going straight to conservation in the field where it is most needed to save wildlife for future generations.

Animal Keepers' Forum

Readers of the *Animal Keepers' Forum* have experienced an exciting evolution of the journal over the last few years. Many of you remember the *AKF* as a smaller 6" x 9" journal, printed with black and white text and photos.

As early as 2007, we started experimenting with color covers on the 6" x 9" format, but exciting things were on the horizon. In July of 2013, we converted the journal into a four-color, 8.5" x 11" magazine with glossy paper. Our goal was simple: continue to provide you with the same educational and informative content that our readers have always enjoyed in the *AKF*, while presenting it in vibrant color, easy-to-read formats, eye-pleasing fonts, and highlighted with high-resolution photos and graphics. Our hope was that a better product would be more attractive to advertisers, and ultimately, more people in the industry would be reading and sharing the *AKF*.

In 2014, with a goal to improve our product, get it to the membership more efficiently, and keep printing and mailing costs as low as possible, we changed our printing and mail house companies. The journal is now printed by Watt Printers in Cleveland, Ohio and mailed from Weekley Mailing Service in Berea, Ohio. Our goal is to keep costs low while still giving you a great product, while in turn, keeping your membership rates as low as possible.

The new format of the journal has proven to be very popular with

Thank You!

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**Includes 2013 Event (Late)*

advertisers, Commercial Members, and sponsors. Revenue generated from the journal has significantly increased every year since it was reformatted in 2013. We created premium placement packages in 2013 and those were so popular that they have sold out for the last three years.

The most important thing about the *AKF* is still its educational content and information-sharing component. The members of AAZK continue to provide the journal with top-quality articles that highlight best practice and innovation in animal husbandry, and the latest developments in conservation. In the past year we created some popular dedicated issues: (Reptiles and Amphibians) (Gorillas) (Bowling for Rhinos). We are already working with the Prosimian TAG to feature our next dedicated issue on Prosimians later in 2015. Our *AKF* team invites you to submit an article, update, or photo for the *AKF*.

- Shane Good, Editor
- Elizabeth Thibodeaux, Graphic Designer
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- *Training Tales Column Coordinators:*
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- *Conservation Station Column Coordinators:*
  Amanda Ista, Mary Ann Cisneros

Education

Professional development continues to move in a forward direction through its revised conference structure and distance learning formats. With over 20 workshops available at each conference, attendees are able to attend morning paper presentations on advances in animal care, as well as select workshops in the afternoon. Afternoon workshops now feature 12-hour certification workshops, focusing on specific, basic and advanced skills.

The 2015 AAZK conference's (located in St. Louis) 12-hour certification workshops will concentrate on elephant care and husbandry, ungulate care, and advanced zoo keeping skills. While the elephant and ungulate workshops will concentrate on husbandry and training skills, the advanced zoo keeping certification track will emphasize leadership, decision-making, advanced behavior husbandry, advanced animal health, and communication and problem solving. These 12-hour workshops will be taught by industry leaders, subject matter experts with an emphasis on both instruction, hands-on learning, and skills assessment through our distance learning format.

Supplementing the conference learning format, AAZK has expanded its animal care education by providing online, distance learning opportunities. AAZK has entered the 21st century of collaborative learning and communication through distance learning and expanded communication and networking. Using our own branded version of San Diego Zoo Global Academy, AAZK Online provides users with opportunities to learn from subject matter experts at their own pace.

Changes to our education components represents a huge paradigm shift for AAZK by not only enhancing our conference learning experience, but also by expanding our learning opportunities through distance learning and collaborative networking. Striving to fulfill our mission of advancing excellence in animal care, AAZK Online will be made available to all AAZK Professional members as a membership benefit.

Finances

EXPENSES 2014

AAZK Online	$3,000.00
AKF Mailing	$17,868.94
AKF Printing	$50,129.92
Banking Fees	$233.00
Board Travel/Lodging	$3,494.91
CEO Expenses/Travel/Lodging	$3,003.89
Committee	$7,684.43
Donation	$69.00
Insurance	$1,030.00
Office Supplies	$2,259.06
Office Rent	$6,267.30
Payroll	$77,601.03
Payroll Taxes	$29,761.77
Postage and Delivery	$3,487.18
Product Purchase	$5,095.40
Professional and Legal Fees	$4,276.58
Professional Membership (AZA)	$475.00
Refund	$49.70
Staff Expenses/Travel/Lodging	$1,635.10
Tax and Licenses	$935.00
Utilities	$2,362.53
Web Management	$1,800.50
Total Expenses	**$222,520.24**

INCOME 2014

AKF Advertising	$24,981.41
AKF Sponsorship	$1,250.00
BFR Registration Fee	$960.00
Business Refund	$3,101.54
Conference	$37,897.00
Donation	$20.00
Membership	$116,375.00
Miscellaneous	$174.57
Product Sales	$10,462.88
Recharter Fee and Duty Obligation	$59,948.00
Total Income	**$255,170.40**

MEMBERS

Category	January 1, 2015
Affiliate	547
Commercial	22
Conservation Partner	21
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Exchange	17
Institutional	112
International	27
Library	16
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Professional	1534
Student	195
Total	**2519**

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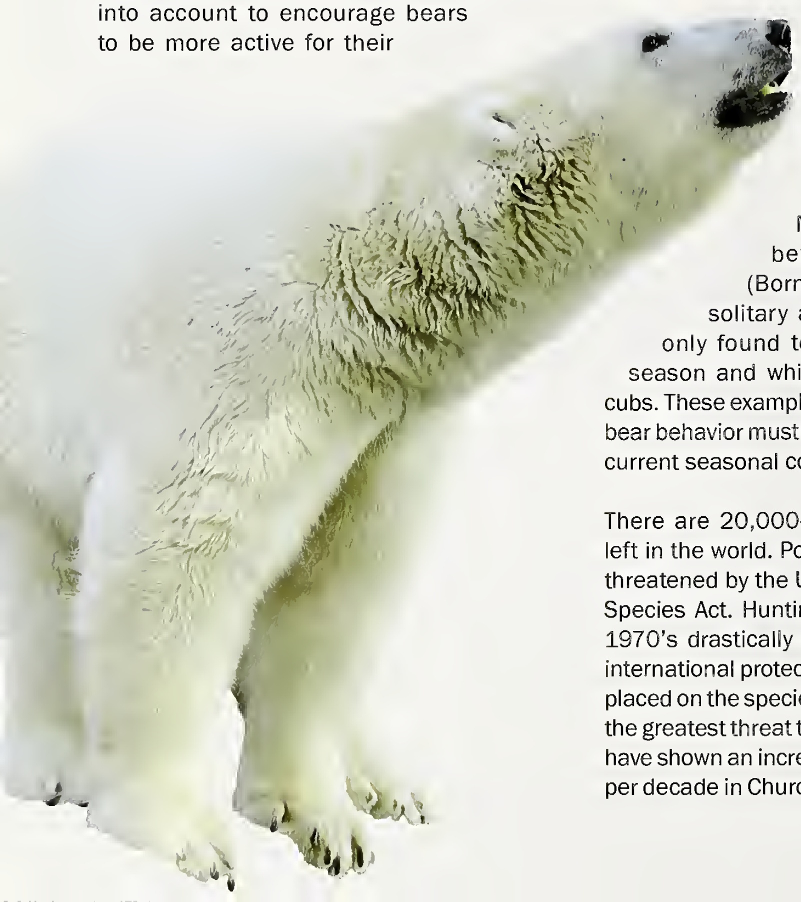
Polar Bears (*Ursus maritimus*): Connections between activity levels, temperature and day length

Kim Sanders, Keeper I
Kansas City Zoo
Kansas City, Missouri

Abstract:

Although polar bears (*Ursus maritimus*) are naturally found in the circumpolar arctic, they are popular animals at zoos around the world. Ensuring their welfare helps capture the attention of millions of zoo visitors and inspire them to care about the conservation of animals in the wild. Currently, there is little information about how temperature and lighting affects zoo-housed polar bears. This study seeks to find if there are certain optimal conditions that these bears should be housed in to enhance their health and behavior. The activity levels of 10 zoo-housed bears at four different facilities were assessed in comparison to temperature and hours of daylight for a four-month period from August-November 2014. The results support the trend that polar bears are more active at the highest and lowest temperatures, as well as on the days with the longest amount of daylight. Although zoos should take this into account to encourage bears to be more active for their visitors, every effort should be made to allow bears to behave as seasonally appropriate.



Introduction:

Polar bears (*Ursus maritimus*) are one of the world's largest carnivores and are found around the circumpolar arctic. These bears hunt, breed and den on their annual sea ice habitat (Stirling and Derocher, 2012). They eat ringed and bearded seals, as long as the environment provides ice for hunting. Polar bears' seasonal and spatial distribution depends on availability of ringed seals (Born et al., 1997). Seasonally, the bears fast for up to four months when the platform of sea ice is unavailable to hunt from (Stirling and Derocher, 2012). Scientists call this seasonal behavior a form of "walking hibernation" (Robbins et al., 2012). Female bears also rely on the snow and ice season for denning. An observational study of wild female polar bears show that they enter their dens between October and November then emerge between March and April (Born et al., 1997). Naturally solitary animals, polar bears are only found together during breeding season and while the mother raises her cubs. These examples begin to show how polar bear behavior must adapt to the upcoming and current seasonal conditions.

There are 20,000-25,000 wild polar bears left in the world. Polar bears are classified as threatened by the United States' Endangered Species Act. Hunting during the 1960's and 1970's drastically reduced populations until international protections and regulations were placed on the species. Today, climate change is the greatest threat to polar bears. Researchers have shown an increase of 0.5 Degrees Celsius per decade in Churchill, Manitoba. This means the sea ice in 2006 warmed up and broke apart three weeks earlier than it did in 1976 (Stirling and Derocher, 2012). The accelerating loss of the sea ice directly impacts the polar bear's survival. Without the ice, the polar bears are running out of space for their most important activities, such as hunting, breeding, and sleeping.

Polar bears are also one of the most popular attractions in modern zoos. The polar bear is considered one of the most "charismatic megafauna" found in zoos today (Renner and Kelly, 2006). These are animals that members of the public seem to quickly and easily care about. Zoo visitors can experience seeing a polar bear close up and are often inspired to care about the conservation of their natural habitats (Renner and Kelly, 2006). Quality zoos provide bears with well-designed exhibits that mimic their natural environment as much as possible. Zoo-housed bears are also provided a variety of enrichment and training opportunities to encourage naturalistic behaviors, such as toys, sensory stimulation, novel foods and social interactions. Providing the best welfare and care possible for the bears makes them better ambassadors for their wild counterparts, who are in grave need of help.

Complete knowledge of polar bear habitat, as well as their behavior interacting with their environment, is useful for managing them in zoos and designing future enclosures (Renner and Kelly, 2006). Summer temperatures in Churchill, Manitoba, are usually about 64 degrees Fahrenheit, but have reached up to 80 degrees Fahrenheit (AZA Bear TAG, 2009). The Polar Bear Protection Act (PBPA, 2002) requires zoos and aquariums housing these bears to supply shade throughout the day. The Bear Taxon Advisory Group recommends other features, such as hills, trees, chilled water, ice piles, air conditioned spaces, and misters or fans (AZA Bear TAG, 2009).

This study investigates how the activity level of polar bears increases or decreases along with both changes in temperature and hours of daylight. The need to study the effect of different climatic conditions on polar bears was driven by the lack of knowledge "if there is an optimal temperature range for polar bears or if and how they utilize environmental resources to thermoregulate within this wide range of environmental conditions" (AZA Bear TAG, 2009). There is also "no information... known about effects that daily changes in light intensity of seasonal changes in light intensity and duration have on polar bear health or behavior" (AZA Bear TAG, 2009). The AZA Bear TAG (2009) requests "more research...to determine if there is a relationship between changing light levels and behavioral or physiological changes in the bears" and "to determine if there is an optimal temperature and humidity range for zoo and aquarium environments [as well as] on the type of resources polar bears need in order to regulate their temperatures within a wide range of ambient environmental conditions". As wild polar bears' behavior varies seasonally, it would likely mean they are getting some cue from either the natural temperature or light changes that happen with changing seasons. Zoos, then, should do their best to provide these natural signals to their polar bears to encourage natural, healthy, behavior.

It was predicted that the activity levels of the polar bears would decrease in both higher temperatures, above 80, and lower temperatures, below 40. They are expected to be most active in moderate temperatures. This is expected because it would conserve valuable energy reserves in extremely cold weather, while keeping the bears cool in extremely hot weather. Many wild animals act to save energy as efficiently as possible. It was also predicted that polar bear activity would decrease as hours of daylight decreased, as bears slowed down for the upcoming season.

Name	Gender	Age	Location
Berlin	F	24	Kansas City
Nikita	M	7	Kansas City
Haley	F	11	Memphis
Payton	M	10	Memphis
Suka	F	2	Minneapolis
Sakari	M	2	Minneapolis
Neil	M	18	Minneapolis
Buzz	M	18	Minneapolis
Berit	F	15	Cincinnati
Little One	M	24	Cincinnati

Table 1. The captive polar bear subjects whose behavior was observed.

The results of this study will help determine how seasonal changes, such as temperature and day length, change polar bear behaviors. This allows zoos to better provide appropriate conditions for their polar bears.

Methods

Subjects

The activity levels of 10 zoo-housed polar bears from four different facilities were assessed for the purposes of this study. This included six males and four females, ranging from ages 2-24 years-old (see Table 1). These facilities are accredited by the Association of Zoos and Aquariums (AZA) and are located in: Cincinnati, Ohio; Minneapolis, Minnesota; Memphis, Tennessee; and Kansas City, Missouri. All bears were housed in similar indoor/outdoor enclosures, received daily, varied enrichment and take part in training programs. The zoo keepers and zoo managers at these facilities volunteered to participate in collecting data for the study.

Study Period

The study took place from August to November 2014. Each facility reviewed the research request for different periods of time and began collecting data immediately after approval, in order to maximize data collected. Therefore, each facility collected between 49 and 87 days of observations.

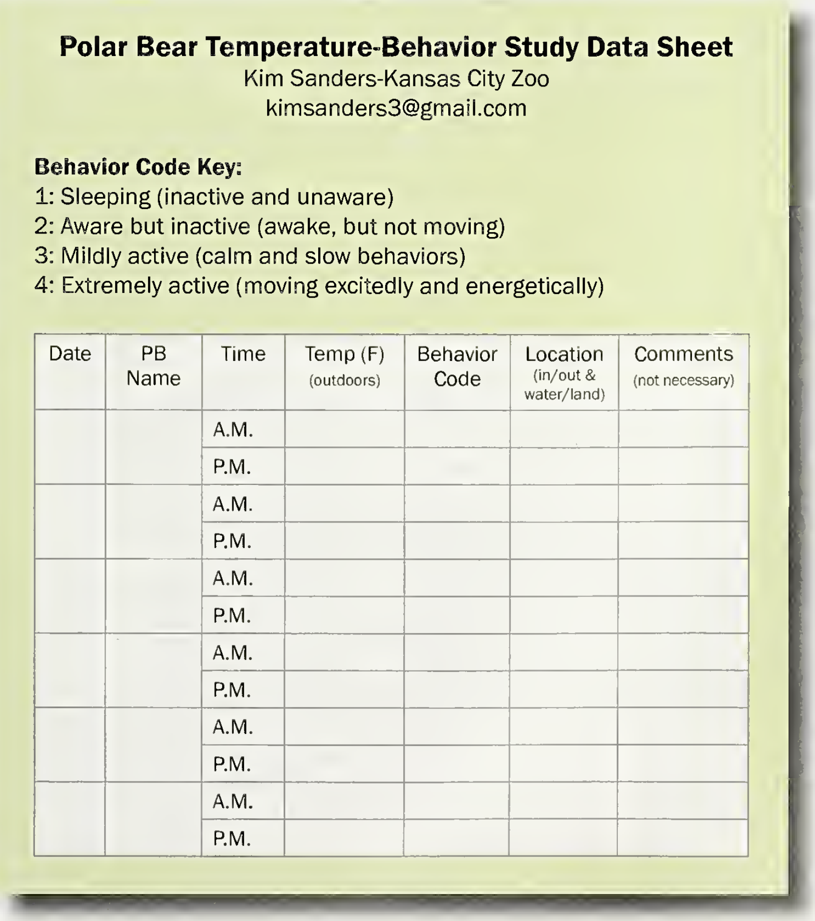
Data Sheet

An original data sheet was created (See below). The primary goals of the data sheet were to collect the required data in as simple and standardized terms as possible. A 1-4 scale of activity was created, with 1 meaning asleep, 2 meaning aware but inactive, 3 meaning mildly active (such as a slow walk or floating in the pool) and 4 meaning extremely active (such as running or swimming). The information requested for each bear was its activity level, location, and the outdoor temperature. There was also a column in the end of each day for zoo keepers to write any comments they thought relevant.

The researcher also independently recorded the time of sunset and sunrise for each location and used this information to calculate hours of daylight for each day, for each location. This information was retrieved online from the Astronomical Applications Department of the U.S. Naval Observatory at http://aa.usno.navy.mil/index.php.

Behavioral Observations

Every day for the study period, two multi-point scans were taken daily. This method of "behavioral scoring" was based on a technique advocated by Margulis et al. (2005) and used by Canino and Powell (2010). In this "behavioral scoring" technique, keepers collect quick behavioral observations of their animals



Polar Bear Temperature-Behavior Study Data Sheet

Kim Sanders-Kansas City Zoo
kimsanders3@gmail.com

Behavior Code Key:
1: Sleeping (inactive and unaware)
2: Aware but inactive (awake, but not moving)
3: Mildly active (calm and slow behaviors)
4: Extremely active (moving excitedly and energetically)

Date	PB Name	Time	Temp (F) (outdoors)	Behavior Code	Location (in/out & water/land)	Comments (not necessary)
		A.M.				
		P.M.				
		A.M.				
		P.M.				
		A.M.				
		P.M.				
		A.M.				
		P.M.				
		A.M.				
		P.M.				
		A.M.				
		P.M.				

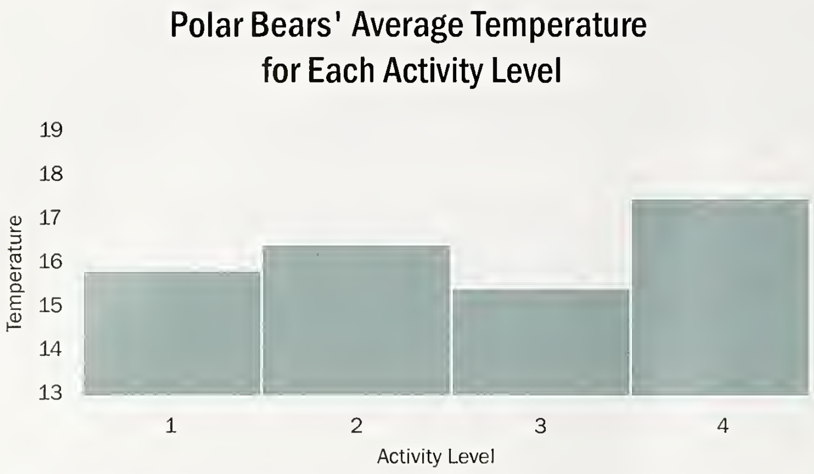


Figure 1. The average temperature, in degrees Celsius, for each activity level, 1 being the lowest energy and 4 being the highest energy, for captive polar bears.

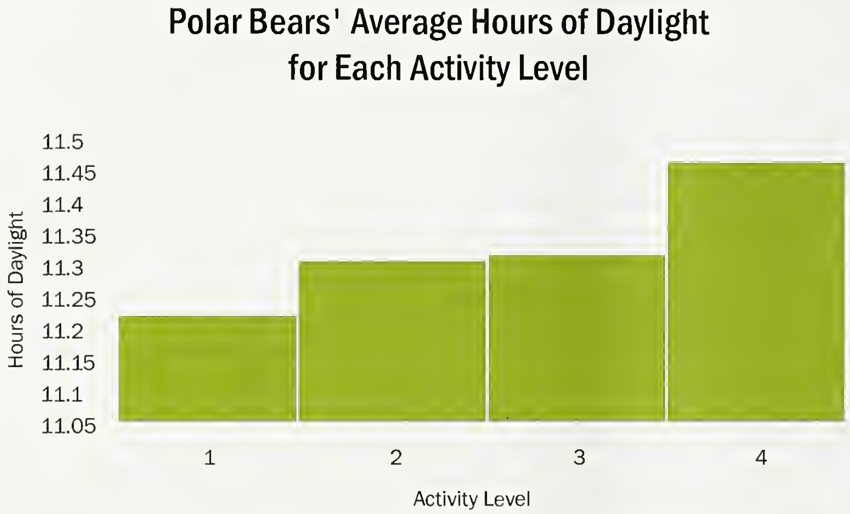


Figure 2. The average hours of daylight for each activity level, 1 being the lowest energy and 4 being highest energy, for captive polar bears.

as they pass by during the daily routine. Margulis and Westhaus (2005) found that data collected this way was just as accurate as more frequent or hour-long intensive observations, even if just collected once per day or even once per week. A small number of these "multi-point scans", even if just a few seconds each, create useful, reliable data in a keeper-friendly way (Canino and Powell, 2010).

Statistics

Since the activity level is categorical, the average temperature (+/- standard error) is found for each activity level; the same is done for hours of daylight. Then, two separate One-Way ANOVA tests were used to tell if this is a significant difference in average temperature or hours of daylight between each activity level.

Results

Temperature

The average temperature (+/- standard error) while polar bears were asleep (category 1) was 15.82 degrees Celsius (+/- 0.67) or 60.47 degrees Fahrenheit. Next, the average temperature while polar bears were awake, but inactive (category 2), was 16.47 degrees Celsius (+/- 0.51) or 61.65 degrees Fahrenheit. Then, the average temperature while polar bears were mildly active (category 3) was 15.41 degrees Celsius (+/-0.42) or 59.75 degrees Fahrenheit. Finally, the average temperature while polar bears were extremely active (category 4) was 17.37 degrees Celsius (+/- 0.71) or 63.27 degrees Fahrenheit (see Figure 1).

Day Length

The average hours of daylight (+/- standard error) while polar bears were asleep (category 1) was 11.22 hours (+/- 0.06). Next, the average hours of daylight while polar bears were awake, but inactive (category 2), was 11.37 hours (+/- 0.05). Then, the average hours of daylight while polar bears were mildly active (category 3) was 11.32 hours (+/- 0.04). Finally, the average hours of daylight while polar bears were extremely active (category 4) was 11.47 hours (+/- 0.08) (see Figure 2).

Statistics

A One-Way Analysis of Variance was run on the data. There was not a significant difference between groups in temperature for polar bear activity level (F=2.082, df=3, p=0.101, F crit=3.294). There was also not a significant difference between groups in hours of daylight for polar bear activity level (F=2.407, df=3, p=0.066, F crit=3.293).

Discussion

Although not statistically significant, the data supports the trend that polar bears tend to be the most active at the hottest temperatures (category 4) and the coldest temperatures (category 3), which is contradictory to predictions. I believe this is because category 4 often represented swimming in the pool, likely cooling the bears off in hot temperatures. The bears were inactive (categories 1 and 2) at the moderate temperatures. This suggests that polar bears are more active in summer and winter months. This also suggests the importance of zoos for providing their bears ways to cool down during hotter temperatures, especially chilled pools, and providing enough space for bears to be energetic in order to warm up on the cold days. Visitors are more likely to be inspired to care about active, healthy-looking zoo animals, so encouraging the bears to decrease their time spent inactive will likely work toward zoos' goals of being conservation centers.

Also, although not statistically significant, the current findings imply that polar bears' activity is directly related to hours of daylight. Polar bears' activity linearly increased as hours of daylight increased. This would indicate that polar bears get their cues to change behavior for the upcoming season by changes in hours of daylight, rather than changes in temperatures. This is understandable, since temperatures could have outliers, such as a warm week in the winter, but sunrise and sunset do not vary during the season. This makes it a more reliable indicator of the upcoming seasonal changes.

Researchers have shown, fittingly, that polar bears in the wild go through many seasonal behavior changes. Grittinger's (1997) activity budget of polar bears at the Milwaukee County Zoo showed that two zoo-housed polar bears were inactive about 30% of the time, but that inactivity peaked seasonally in February-April. This data supports the notion that inactivity for polar bears increases as the days get shorter, in the winter. All types of behaviors in Grittinger's study seemed to have seasonal peaks, with "autoplay" peaking in June to January and social behavior peaking in December to March. These trends show the significance of seasonal behavior trends in polar bears.

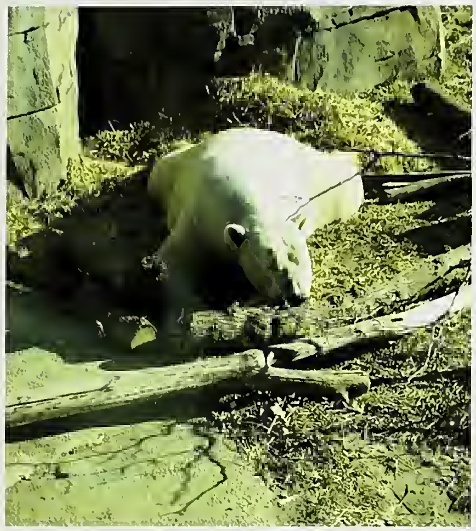


Photo 1. Nikita asleep in a straw pile on exhibit at the Kansas City Zoo shows a level 1 activity.

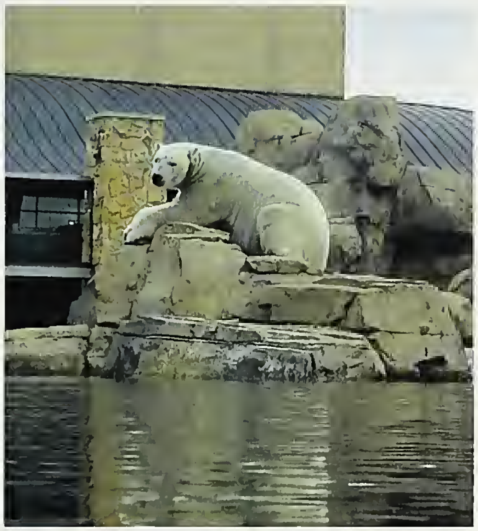


Photo 2. Nikita resting on a rock on exhibit at the Kansas City Zoo shows a level 2 activity.

Photo 3. Berlin, mildly active exploring a log pile on exhibit at the Kansas City Zoo, is a level 3 activity.

Another study on the activity budgets of wild bears has shown polar bears to spend 66.6% of their time inactive (Stirling, 1974). Knudsen's 1978 activity budget of wild polar bears showed them spending 86.8% of their time in the summer months inactive. This study, on the other hand, refutes the current finding that the bears are most active in hotter temperatures.

Although zoos would like their bears to be active for their guests, it is important to remember that inactivity is an important natural behavior for polar bears. The most important thing is encouraging zoo-housed polar bears to behave as much like their wild counterparts as possible. This includes seasonal changes, such as spikes in levels of activity and play. It is suggested that zoos provide naturalistic, seasonal lighting and temperature changes for their polar bears.

Given the necessary resources to take this project to its next phase, it would be important to complete a full-year cycle of activity level changes, to fully assess the seasonal effects. It also would be helpful to recruit more facilities in data collection, particularly from facilities in warmer climates that may not experience noticeable seasonal changes. The results from this study do show a contradiction, that polar bear activity decreases as the days get shorter, yet the coldest temperatures showed the second highest activity rating. This contradiction could be solved with a longer, fuller study.

Acknowledgements

A huge thank you goes out to the polar bear keepers and managers at Cincinnati Zoo, Como Zoo, Memphis Zoo, and Kansas City Zoo for their dedication in collecting this data, especially Lisa Vollmer, Julie Yarrington, Travis Caskey, and Andrea O'Daniels for keeping in touch with my endless e-mails. Polar bear conservation owes much to the hard work of zoo teams like these. Also, this work would not have been possible without support from Project Dragonfly and the Global Field Program at Miami University, especially Liz Dame and Hays Cummins.

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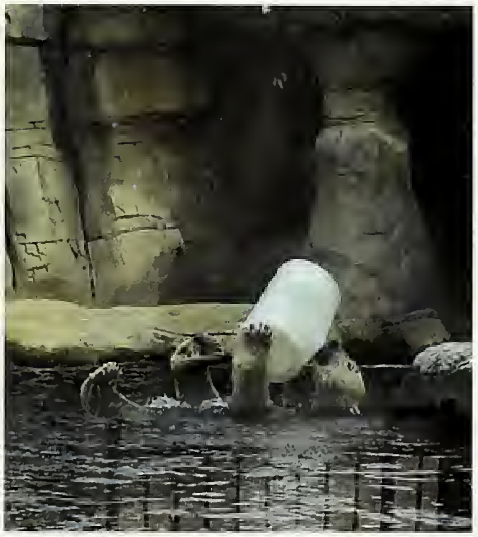

Photo 4. Nikita, energetically playing with a barrel toy on exhibit at the Kansas City Zoo, shows a level 4 activity

Shepherdson, D., Lewis, K.D., Carlstead, K., Bauman, J. and N. Perrin. 2013. Individual and environmental factors associated with stereotypic behavior and fecal glucocorticoid metabolite levels in zoo housed polar bears. *Applied Animal Behaviour Science* 147:268-277.

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EDITORS: Jay Pratte, Henry Doorly Zoo • Kim Kezer, Zoo New England • Beth Stark-Posta, Toledo Zoo

Training a 1.2 Black Howler Monkey Group for Routine Physical Exam Day

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Helen Brach Primate House, Lincoln Park Zoo, Chicago, IL 60614

ABSTRACT

It is beneficial for the animals, as well as keeper and veterinary staff at Lincoln Park Zoo's Helen Brach Primate House, to limit the stressors associated with immobilizations, such as routine annual physical examinations, to a single event, in which all of the individuals of a social group are transported to the animal hospital at the same time. Historically, our 1.2 Black Howler Monkeys (*Alouatta caraya*) were netted and manually restrained in order to receive an immobilization agent via hand injection or to be placed in a crate or squeeze cage. Often they were transported to the animal hospital at different times and in multiple trips. These techniques were stressful, increased the risk of injury for keepers and animals alike, and were time consuming. As a result, the animals were highly sensitive to aversive cues, including: the presence of nets, gauntlet gloves, transport crates, squeeze cages, and even the process of fasting from food and water overnight. Ultimately, on an exam day, the animals' stress response was prompted before any attempt at capture and restraint was even made.

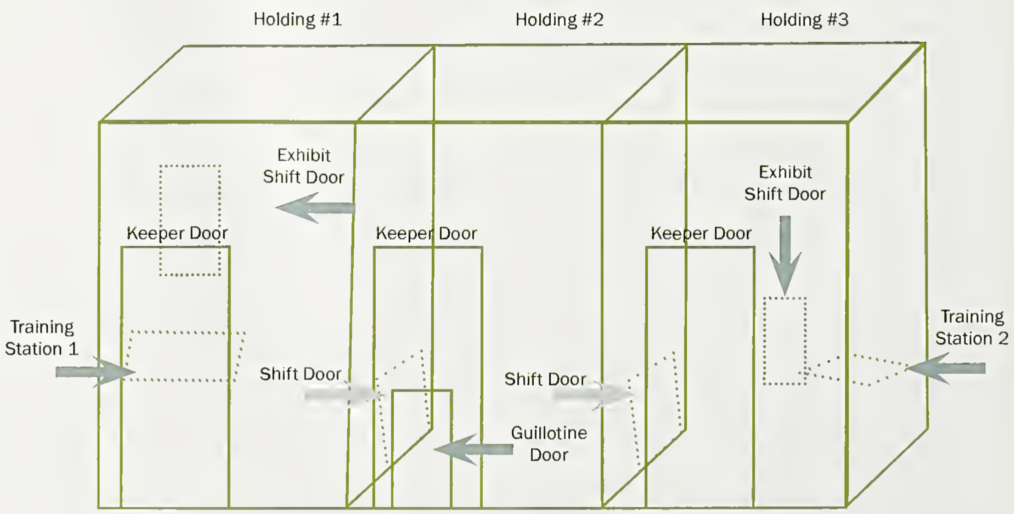
This paper will outline the different preparatory strategies that were implemented in order to accomplish our goals of: 1) voluntarily crating the male howler monkey into a trap cage, 2) then simultaneously hand-injecting the two howler monkey females, in order to 3) allow for the transport of all three individuals to the animal hospital in a single trip. Specifically, keeper staff initiated an operant conditioning training program for all three howler monkeys to accomplish voluntary hand injections and crating behaviors. Furthermore, staff implemented daily routine separations and employed desensitization techniques to mimic the overnight fasting process. Communication and consistency, as well as coordination and cooperation of both keeper and veterinary staff were essential throughout the process and especially on exam day. The key to accomplishing these goals was making everything part of the animals' daily routine thereby reducing their response to aversive cues and increasing the likelihood that the howler monkeys would perform their targeted behaviors on exam day just as they would any other day.

INTRODUCTION

At Lincoln Park Zoo 1.2 Black Howler Monkeys (*Alouatta caraya*) and 2.0 Geoldi's Monkeys (*Callimico geoldii*) live together in a mixed species exhibit in the Helen Brach Primate House. Their holding area consists of three adjacent enclosures with two shift doors leading to the exhibit. The middle enclosure has a guillotine door where an external trap cage can be affixed {See Appendix B.} The species are separated overnight and reunited on exhibit together during the day. Besides shifting practices to and from holding and exhibit, the howler monkeys were not actively participating in any formalized operant conditioning training program.

Historically, the howler monkeys were suspicious of anything out of the ordinary,

Howler/Callimico Holding



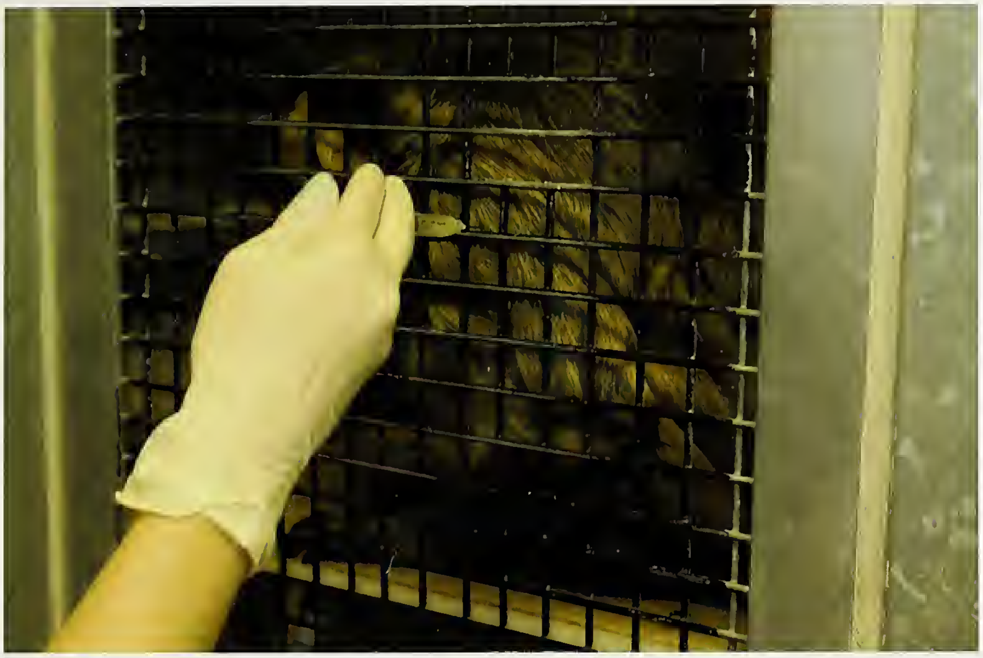


Photo 1: Presenting shoulder for hand injection. *Photo by Anita Yantz*

especially any changes in their daily husbandry routine associated with exam day. For example, they were accustomed to having access to the exhibit overnight; however, on the night before exam day, they were secured into holding to be fasted from food and water as well as to ensure they were accessible to the veterinarians for the following morning's medical procedure. The howler monkeys were also uneasy about being separated from each other, as this was typically done opportunistically the morning of exam day. As a result, they would exhibit behavioral signs of stress (e.g. hiding, refusal to come up for hand-fed preferred items, diarrhea) on exam day, even before the veterinary staff arrived.

In order to immobilize the howler monkeys, each individual had to be either netted/ manually restrained for an injection, darted, or displaced in to a squeeze cage using aversive stimuli such as nets and gauntlet gloves. These methods were not only time consuming and dangerous for both the keepers and the animals, but also were loud and disruptive to the animals in adjacent enclosures.

Animal care staff decided to implement a formalized operant conditioning training program with the overall goal of reducing the amount of stress for the howler monkeys on exam day, while making the immobilization process more efficient for staff. Keepers consulted with veterinarians to develop a strategy for exam day. It was decided that two individuals would be simultaneously trained to receive a hand injection for immobilization at the Primate House. The other would be trained to voluntarily enter/be shut into/ and wait calmly in a trap cage so that all three howler monkeys could be transported to the hospital at one time. The keeper staff devised and implemented a training program that focused on three main components. First, training sessions for the group needed to follow the exact order of events as they would take place on the actual exam day. Training goals included establishing individual stations and incorporating daily separations. Second, training goals for each howler monkey were determined and shaping plans for voluntary hand injection and/or voluntary crating were written. Finally, desensitization techniques were implemented to mimic the process of being secured in the holding area and fasting from food and water overnight.

METHODS

Separation training and stations:

To accomplish separating the howler monkeys from each other it was necessary for all three holding areas to be available. Typically the 2.0 Callimico occupied one holding area overnight; therefore they needed to be shifted onto the exhibit prior to training. If the Callimico were sent out too far in advance, the howler monkeys would start getting restless, expecting to be let out on exhibit next. Consequently, it was decided that howler training would always take place in conjunction with shifting. Callimico would be shifted onto exhibit; each howler monkey would be separated and individually trained, and then immediately reunited and shifted onto exhibit (except on exam day.) To establish the separation, after the Callimico were shifted out, all shift doors between holding areas were opened and the first individual to move into the furthest holding was shut in there, followed by calling another individual to the middle holding separating the remaining two. Each was reinforced and then they were all reunited. After the first couple days, the same individuals separated into the same holding areas, and those holdings ultimately became their stations. Once their stations were established, they were not trained or reinforced unless they voluntarily separated into their correct holdings. Although they were initially uneasy about separating, once they realized they were getting fed and would soon be reunited, they were all very willing and eager to separate; a process that took less than one week to establish.

PLAN

Voluntary Hand-Injection

Initially, all three individuals were trained with the goal of voluntary hand injection (Photo 1). All three howlers were, and still are, afraid of novel training props. Thus, it took several sessions to desensitize them to presence of the new training items, such as targets and syringes. Once the target behavior was solidly established, the behavior was then transferred from a target stick to a handhold where they would hold with one hand for progressively longer increments of time . All three individuals were much better at actually holding the handhold with one specific hand, allowing us to use the behavior to reposition their bodies in order to shape the shoulder presentation behavior.

With the monkey in position using the handhold, a target stick was used to gradually prompt them to move their shoulder closer and closer to the cage front until they were pressing their shoulder flush against the mesh and holding it until bridged. The target stick was then phased out, and one finger pointing to the shoulder and the verbal cue of "shoulder" was established. They were then desensitized to the blunted needle and its application with varying degrees of pressure. Once the "injection" behavior was established, and other behaviors were trained, every session was, and still is, started with this behavior in order to make it as routine as possible and to simulate the order of events on exam day. We never try to sneak the injection; the syringe is always visible and they know exactly what to expect.

Crate

Veterinary staff agreed to immobilize two individuals at the primate house leaving one howler monkey to be transported awake to the zoo's animal hospital. It was therefore determined that one individual needed to be "crate trained" (a wire mesh trap cage was actually used, not a traditional kennel crate).

The male howler monkey's training station was already established in the only holding area with a guillotine door where an external crate could be affixed; therefore, he would be the one to be transported awake and training "crate" became a priority for him (Photo 2). The process was started by allowing the 1.2 group access to the trap cage daily, outside the context of a training session. Then the male's training station was moved into the trap cage. He was further desensitized by being reinforced for staying, while keepers rattled the trap cage door, then closed and immediately reopened the door, next closing the door, then training him and reopening the door. Ultimately, he was closed into the trap cage and left there while the trainer walked away to train both females, then came back to train him and reopened the door. By making it routine for him to sit and wait in the trap cage while the females were trained first, it ensured that he would not get agitated and subsequently cause the females to be too wary to train on the actual exam day.

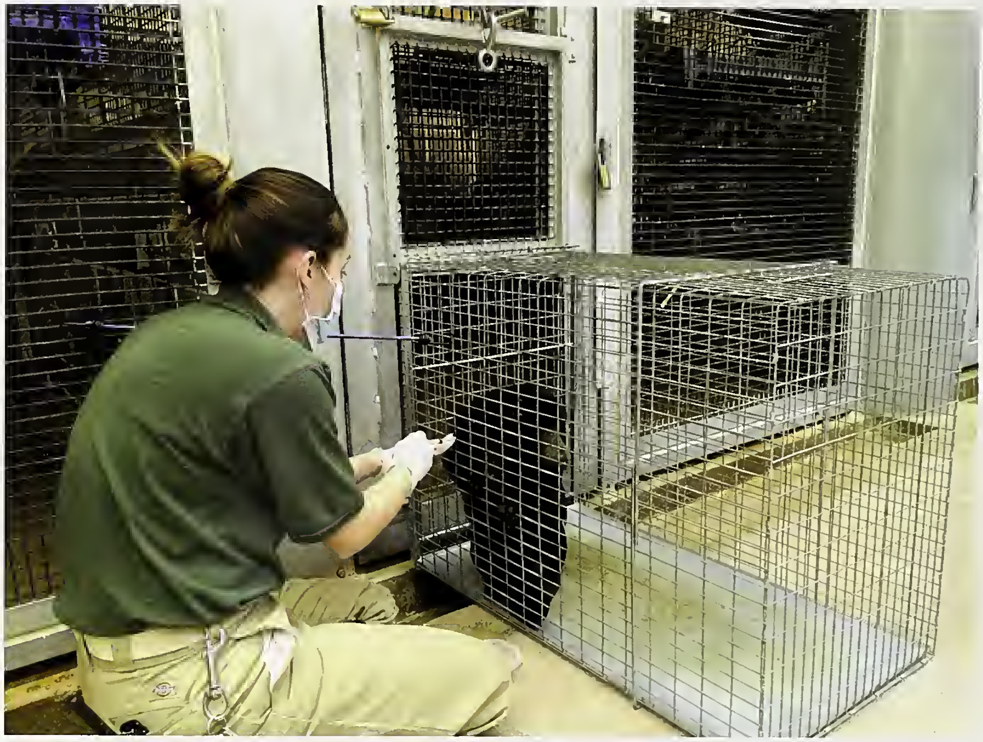


Photo 2: Male in transfer crate
Photo Credit to Anita Yantz

Desensitization
There were multiple stimuli that the monkeys needed to be desensitized to. These individuals had already had a lifetime of negative experiences with nets, gauntlet gloves, etc. We felt we were not going to be able to totally desensitize them to the presence of these objects; therefore it was decided to simply be cognizant of their use in the animals' presence. Whenever possible, these items were not touched or moved if the howler monkeys were in holding.

One of the most aversive stimuli to be addressed was the overnight fasting from food and water, while being locked in holding. In the past they were already suspicious in the morning if they had been locked in holding overnight. We started desensitizing them by locking them in once a month, then twice a month, and finally once per week in the month leading up to their scheduled exam day. To simulate exam day as much as possible, on the morning after a lock-in night, they were not given any food until their training sessions later in the morning.

Lastly, having more than one trainer interacting with them at one time was not something that they were accustomed to. Traditionally, this often only happened when something aversive was occurring, and therefore made them nervous. As mentioned previously, the second trainer was incorporated as often as time and scheduling allowed in order to desensitize them to having multiple people interacting with them at one time.

Staffing
For consistency and time management purposes, one primary trainer established the separation training, and shaped the individual shoulder presentation, hand injection, and crating behaviors. The trainer's days off were also training days off for the howler monkeys. However, for this to work on exam day the two females needed to be injected as close to the same time as possible. Therefore, the "injection" behavior of one of the females was handed off to another trainer. This trainer was then incorporated into training sessions a few times a week as often as time and scheduling would allow.

Communication
Exam day choreography required a lot of cooperation. Keepers needed to communicate with each other on a daily basis as to when the exhibit was ready for the animals to be shifted; the two trainers had to make sure to listen to each other as to when they were ready to give the injection and to keep each other calm. Most importantly the veterinarians had to communicate to the keepers what information they needed after the injections (of immobilization agents) were administered so they would not need to come back into holding until the animals were fully sedated.

In a perfect world, the goal was to have the male howler monkey secured into the crate and the two females injected and under sedation at the exact same time. In reality, each individual reacts to anesthesia at different rates, which sometimes means that vet staff has to come in to assess one individual while the other is not completely sedated yet. All that can be done is to try and coordinate the injections as much as possible, and to keep things as quiet and calm as possible.

CONCLUSION

A few weeks prior to their scheduled routine annual exams, all three individuals were fully cooperating with the training process and everything was working as planned on a daily basis. Unfortunately, due to growing medical concerns for our male, he was immobilized separately on an earlier date using his "injection" behavior. The physical examinations for the two females remained scheduled on the original date just a couple of weeks later; therefore, they were both still apprehensive. Both still presented their shoulders for their injections; however one of them pulled away and needed a supplementary injection. The following year for routine annual exams, with a new male integrated into the group, the male voluntarily crated and the females presented their shoulders for voluntary hand injection; all behavioral goals were met, although one female still required a supplemental injection.

This paper was presented at the NWPTAG meeting November 2012.

BHC Comments
by Beth Stark-Posta:

This project is a great example of how a well thought out training project can benefit the animals (and staff) for years to come. Here the animal care staff recognized the aversive stimuli the animals were faced with before and during medical procedures, and the potential risks to animals and staff. They turned their knowledge into the ability to make a positive difference in the animals' lives by giving each monkey a choice to participate and walk away having had a positive human-animal interaction. Staff saw the benefits of using positive reinforcement and desensitization techniques to build trust and confidence in the monkeys. While an initial investment in keeper time, their efforts paid off - for years! Congratulations on a job well done!

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Submit a brief description of a training project at your facility. These can be 500 words or less, in text or bullet points – it can be longer (up to 1000 words); however, short and simple descriptions with a few images are just as perfect. Details should include the following:

- Define the training goal (what did you try to do and for what purpose?)
- List important steps (How did you do it – include plans that changed along the way/what worked & what didn't work)
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- Tips you learned along the way
- Include 3-5 digital photos that clearly depict the animal in the learning process or performing the desired goal (provide photo caption and photographer of each image). Photos need to be 300 dpi and at least 1200 x 1800 pixels.

Please send submissions or questions to:
Kim Kezer at kkezer@zoonewengland.com or Shane Good at shane.good@aazk.org
(use Training Tales Submission as the subject)

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